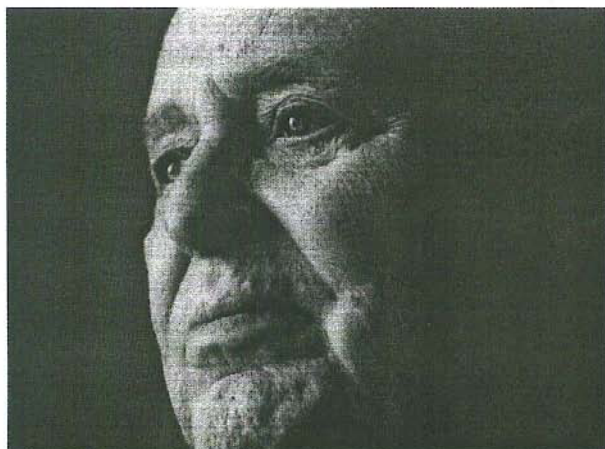


When the pressure is too low: hypotension in the elderly

Case study 1

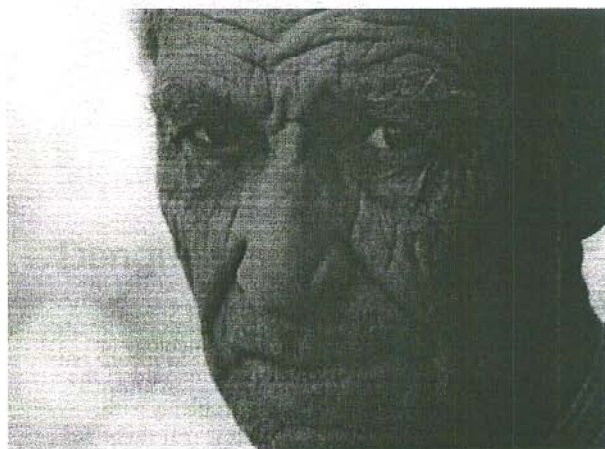


Mr JL is a 79-year-old patient who has come to the pharmacy for a bandage for his elbow after falling at home.¹ He said that he had got out of his bed to answer the doorbell. As soon as he got up he started feeling lightheaded and after taking a few steps he fell down. He did not lose consciousness and did not strike his head on the ground. After falling, his lightheadedness resolved and he was able to get off the ground. He also reported that he has had similar, but milder, symptoms for the past two months. On getting up after lying down, he usually sits on the edge of the bed for a few minutes until his symptoms resolve and then gets up slowly. He has not noted any palpitations but says that he feels weak and tired. His medical conditions include type 2 diabetes, hypertension, and benign prostatic hyperplasia. His medications include:

- Aspirin 100mg daily
- Glimepiride 3mg daily
- Metformin 500mg twice-daily
- Quinapril 10mg daily
- Terazosin 2mg daily.

You suggest to Mr JL that he should visit his GP for assessment of his blood pressure control. Subsequently, his blood pressure was found to be 136/78mm Hg with a pulse of 76 while lying down. After standing for three minutes, the blood pressure was 98/68mm Hg and the pulse was 88/min. Cardiovascular examination showed a regular rhythm and no murmurs. On neurological examination, he had decreased sensation to light touch on the soles of both feet. No tremors, nystagmus or gait abnormalities were noted. Serum electrolytes were found to be normal, serum creatinine was 0.13mmol/L and the HbA_{1c} was 6.8%. Mr JL was diagnosed as having orthostatic hypotension.

Case study 2



A 68-year-old man was admitted to hospital with acute alcohol withdrawal.² On admission, he suffered from a range of physiological and psychological symptoms including malnutrition, incontinence, ataxia, tremors, and aggressive behaviour. A 12-month history of falls and depression preceded this admission. His recurrent falls had been attributed to an increasing intake of alcohol since the death of his wife two years previously. He stated that he took no regular medications. A marked contrast between lying and standing blood pressure was quickly identified and he was diagnosed with orthostatic hypotension. Subsequent cardiovascular investigations proved inconclusive. During the admission a pharmacist saw him using a glyceryl trinitrate spray, which he told her he had been prescribed 12 months previously by his GP for angina. He had been using it three to four times each day over the past 12 months. The patient was advised to stop taking his glyceryl trinitrate spray to see if his symptoms subsided, which they did, and he was commenced on a beta-blocker for prophylaxis against angina.

The previous article in this column discussed hypertension and its management in the elderly. Equally problematic can be hypotension in older patients, with the risk of causing falls and fractures, and ischaemic strokes. Orthostatic (or postural) hypotension, in particular, is common in the elderly. It occurs in about 15 to 35% of all elderly individuals – in 15 to 20% of community-dwelling and about 50% of elderly persons in aged care facilities.³⁻⁷ The prevalence of orthostatic hypotension rises with increasing age. Oddly enough, elderly patients with hypertension are at increased risk of also being troubled by hypotension. The prevalence of orthostatic hypotension is higher in summer than winter.⁸

Table 1: Drugs commonly associated with orthostatic hypotension in the elderly

Tricyclic antidepressants
Antipsychotics
Vasodilators (e.g. nitrates)
Antihypertensives and diuretics
Levodopa and dopamine agonists (e.g. bromocriptine)
Alpha-adrenoceptor antagonists for benign prostatic hyperplasia (e.g. tamsulosin, terazosin)
Sildenafil and other phosphodiesterase-type 5 inhibitors.

Table 2: Non-pharmacological approaches to orthostatic hypotension in the elderly^{1,13,17}

Withdrawing or reducing dosage of potentially hypotensive drugs
Avoiding hot showers or exertion in warm environment
Avoiding straining activity
Adequate fluid intake to prevent dehydration
Increasing salt intake, if tolerated
Eating small meals more frequently
Avoiding alcohol
Drinking caffeine-containing beverages on awakening and with meals, if tolerated
Wearing waist-high compression stockings
Sleeping in the head-up position
Slowly arising from supine or sitting position or when picking something off the floor etc.
Crossing one's legs a few times before arising from supine or sitting position
Bending at the knees if possible and keeping the head above heart level (squatting posture)
Avoiding bed rest during the day as this can lead to deconditioning.

Orthostatic hypotension is defined as a fall in systolic blood pressure on standing greater than 20mm Hg or a fall in diastolic blood pressure of greater than 10mm Hg within three minutes of standing.⁴ It may be symptomatic or asymptomatic. The symptoms can include lightheadedness, weakness, cognitive impairment, blurred vision, fatigue and lethargy, and falls.^{1,3} Orthostatic hypotension can clearly limit the elderly person's autonomy and quality of life.⁹

Several longitudinal studies have examined outcomes associated with orthostatic hypotension and shown that its presence is an independent risk factor for falls, ischaemic

stroke, myocardial infarction and all cause mortality.^{1,3-5, 10-14} Furthermore, the degree of drop in blood pressure corresponds linearly to increase in mortality.^{1,11}

*'With age our ability to maintain haemodynamic homeostasis during position changes becomes less effective. This predisposes elderly patients to significant changes in blood pressure upon standing and orthostatic hypotension.'*⁵

Older people are more vulnerable to hypotension for a number of reasons, including decreased baroreceptor responsiveness, increased arterial stiffness and altered blood volume regulation.^{3,4,9} Baroreceptor reflex mechanisms normally regulate blood pressure by increasing or decreasing heart rate and vascular resistance in response to transient decreases or increases in mean arterial pressure. With advancing age, however, the baroreflex response to blood pressure changes progressively declines, and the risk of hypotension increases.³

The diminished baroreflex response may be caused partly by arterial stiffening due to atherosclerosis, which results in dampening of baroreceptor stretch and relaxation during changes in arterial pressure. The blunted baroreceptor response becomes clinically significant when common hypotensive stresses, such as postural changes, can no longer be rapidly or completely offset by compensatory increases in heart rate or in vascular resistance.

With age, cerebral blood flow decreases. Cerebral autoregulatory mechanisms usually compensate for acute reductions in blood pressure. Autoregulation of cerebral blood flow is generally maintained with age, except in persons who have symptomatic orthostatic hypotension. However, chronic hypertension raises the lowest blood pressure at which autoregulation can maintain cerebral blood flow. Below this level, blood flow may decrease, increasing the risk of cerebral ischaemia. Because of age- and disease-related (e.g. atherosclerosis) decreases in cerebral blood flow, elderly patients are vulnerable to cerebral ischaemia (transient ischaemic attacks or stroke) and syncope if blood pressure decreases.³

The elderly are also more likely to possess medical conditions, including congestive heart failure, arrhythmias, Parkinson's disease and diabetes mellitus (via autonomic neuropathy), or be taking medications (Table 1) that can contribute to orthostatic hypotension.^{1,10,15} In our cases, the alpha-adrenoceptor antagonist, terazosin, and excessive use of nitrate therapy were implicated.

Non-pharmacological approaches (Table 2), including the elimination of any contributory factors, the patient's education, slow position change, increased fluid and sodium intake, compression stockings¹⁶ and elevation of the head of the bed, form the basis of the initial management of orthostatic hypotension.^{1,3,4,9,10,13}

*'When assessing orthostatic hypotension in the elderly, drug treatment should always be reviewed. Whenever possible, antihypertensive drugs should be discontinued, and the dosages of essential drugs should be reduced.'*²⁵

In hypertensive individuals with no pre-treatment orthostatic hypotension, the use of antihypertensive medication can be safe and lead to a low risk of developing orthostatic hypotension.⁵ In individuals with pre-treatment orthostatic hypotension or who develop orthostatic hypotension while on antihypertensive medications there should be preferential and careful use of antihypertensive classes that are less likely to exacerbate postural blood pressure changes (e.g. ACE inhibitors, angiotensin-receptor antagonists and beta-blockers). It has been shown that the judicious use of antihypertensive drug therapy helps regulate blood pressure fluctuations and actually improves orthostatic hypotension.^{5,10} Careful management of electrolyte disturbance can decrease the risk of developing orthostatic hypotension with diuretic use.⁵

For persistent, symptomatic orthostatic hypotension not responding to these methods, pharmacological treatment with fludrocortisone or pseudoephedrine should be tried.^{1,3,4,10} Pharmacological treatment is aimed at increasing plasma volume and preventing plasma pooling. Fludrocortisone, a synthetic mineralo-corticoid, is used as a first line agent. It causes sodium retention and thus increases plasma volume. It also enhances sensitivity of blood vessels to circulating catecholamines.¹ The starting dosage is 0.1mg orally daily, increasing to 0.2mg daily if needed. Higher doses might be necessary but are associated with increased risk of mineralo-corticoid adverse effects.¹³ Potassium supplementation might be required, particularly at higher dosages. There is also the risk of precipitating heart failure in people with impaired myocardial function due to expansion of the intravascular fluid volume.¹³

Pseudoephedrine (30-60mg three times daily) could be used alone or with fludrocortisone. It is contraindicated in ischaemic heart disease. Adverse effects include agitation, tremulousness, decreased appetite, dry mouth and urinary retention in men.¹³

Most people will have a reasonable response to lifestyle adjustment, fludrocortisone and/or pseudoephedrine. In resistant cases other options can include octreotide, dihydroergotamine, non-steroidal anti-inflammatory drugs, erythropoietin and desmopressin.^{1,3,4,10,13}

*'The goals of treatment are to improve symptoms and to make the patient as ambulatory as possible rather than trying to achieve arbitrary blood pressure goals. With proper evaluation and management, the occurrence of adverse events, including falls, fracture, functional decline, and myocardial ischaemia, can be significantly reduced.'*⁴

With the ageing population and the more aggressive use of cardiovascular agents in the management of hypertension and heart failure, the problem of orthostatic hypotension will be encountered much more frequently.⁵ Drugs are a major cause of orthostatic hypotension,^{13,15} and pharmacists have an important role to play in warning patients and carers of the potential for orthostatic hypotension, monitoring for its occurrence and assessing risk when performing medication reviews.

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